

services.⁸³ In formulating the X factor, the Commission did not specifically analyze the trends in LEC input prices relative to the GNP-PI. Instead, the calculation relied critically upon an *assumption* that LEC input prices rise faster than the GDP-PI.⁸⁴ This assumption resulted in the “differential” productivity offset concept, which subtracts out national economy productivity from the actual LEC productivity to calculate the productivity offset.⁸⁵

This LEC *assumption*, which is embedded in the 3.3% offset, can now be tested using actual LEC data. ETI has analyzed the actual data for LECs in seven states. These tests, using the results of detailed empirical economic studies, show that the implicit LEC (and FCC) assumption regarding input price movements is false. In fact, rather than rising faster than GDP-PI, these studies confirm that LEC input prices rise an average of 1.0 percentage point more slowly than the GDP-PI. This input price differential can, and should, be used directly in the derivation of the price cap formula. Incorporation of this result — based upon actual LEC data for the post-divestiture time frame — shows that the current X factor is too low and must be increased.

The consequences of this finding for LEC ratepayers are significant. Because the nature of the inputs used by local telephone companies is not representative of inputs for the economy generally, the price of LEC inputs does not increase at the same rate as the average for the economy overall. Accordingly, unless this condition is expressly recognized, the price adjustment mechanism applies an incorrect inflation rate for LEC inputs. Since the price adjustment mechanism does not reflect the fact that LEC input prices are rising *more slowly*

83. The original FCC price cap decision was based on the fixed weight Gross National Product Price Index (GNP-PI). In the last several years, the US Department of Commerce has been phasing out the use of the GNP-PI in favor of the fixed weight Gross Domestic Product Price Index (GDP-PI) to measure economy wide output prices. The two data series provide essentially identical results. Throughout this report, we reference the GDP-PI as the appropriate measure of national output prices.

84. See, e.g., LEC-sponsored testimony by several economists in California, Pennsylvania, and Illinois: Testimony of Dr. M. Shankerman (GTE California), at 12, California PUC Docket No. I.87-11-033, *In the Matter of Alternative Regulatory Frameworks for Local Exchange Carriers*, May, 1989; Testimony of Dr. W. Taylor (Bell of Pennsylvania), Respondent's Statement No. 3.0, at 28, Pennsylvania PUC Docket No. 930715, *The Bell Telephone Company of Pennsylvania's Petition and Plan for an Alternative Form of Regulation Under Chapter 30 of the Public Utility Code*, October, 1993; and Testimony of Dr. L. Christensen (Illinois Bell), Illinois Bell Exhibit 5.0 at 13-14, Illinois Commerce Commission Docket No. 92-0448, *In the Matter of Illinois Bell Telephone Company's Petition to Regulate Rates and Charges of Noncompetitive Services under an Alternative Form of Regulation*, December, 1992.

85. FCC, *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket NO. 87-313, *Second Report and Order*, FCC 90-314 released October 4, 1990 at para. 74. A complete mathematical derivation is provided in the technical analysis of this issue later in this section.

than those for the economy generally, LECs are, in effect, being reimbursed at a higher rate than their actual expenses, and the rates charged to ratepayers for LEC services are overstated.

This factor has been explicitly recognized in recent proposed price cap decisions by Administrative Law Judges in California, Pennsylvania, and Illinois. In California, ALJ Reed noted:

Dr. Roddy [of ETI] submits that the LECs' costs grow much more gradually over time than do the costs faced by the overall economy. He maintains that, over the past eight years, California LECs have seen their costs grow at a much slower rate than GNPPI. According to his study [D. Roddy, "A Study of Total Factor Productivity in the California LEC Telecommunications Industry"], annual average LEC input price growth inflation in California from 1984 through 1991 was 2.1%, while GNPPI grew at the rate of 3.7%.⁸⁶

The 3.7% minus the 2.1% yields a 1.6% input price differential. ALJ Reed further concluded that Pacific Bell had not provided any evidence to the contrary:

As such, the assertion that the average difference between the two is 1.6% does not appear to be refuted in the record.⁸⁷

A similar conclusion was reached in Pennsylvania, where the ALJs found that:

To devise a reasonable PSM ["Price Stability Mechanism"], therefore, the input differential must be used. The input differential here is the difference between Bell's [Bell Atlantic—Pennsylvania's] rate of input price inflation and the GDP-PI. Without using an input price differential, Bell's PSM would reimburse it at a higher rate than its prices reflect and rates would be too high. This is because Bell's input prices are rising slower than the input

86. Proposed Decision of ALJ Reed, California NRF Review, California Public Utility Commission, Applications 92-05-002 and 92-05-004, *Applications of GTE California and Pacific Bell for Review of the Operation of the Incentive-Based Regulatory Framework adopted in California PUC D.89-10-031*, March 7, 1994 at 11-12.

87. *Id.*, at 12. ALJ Reed did not incorporate the 1.6% explicitly since she has already proposed an X factor of 6.0% for the next three years (*Id.*, at 41). This is far in excess of the FCC's current 3.3% X factor.

prices of the economy as a whole. We accept PCTA witness Roddy's analysis of input prices for Bell and GDP-PI and his use of the period 1988-1992.⁸⁸

Furthermore, in the current Illinois alternative regulation docket, calculations based upon standard economic theory and Illinois Bell data, showed that Illinois Bell had actually experienced an input price inflation growth rate represented by GDP-PI *minus* 1.6.⁸⁹ Dr. Christensen, a witness for Illinois Bell, admitted that Illinois Bell input prices grew at a rate of 2.1% for the 1984-1991 timeframe in contrast to the growth rate of 3.7% for GDP-PI during the same time period.⁹⁰ To accommodate and adjust for their incorrect assumption, Illinois Bell modified its original alternative regulation plan through rebuttal testimony of its Senior Vice President of Regulatory Affairs, David H. Gebhardt, Jr.:

[I] believe that the GDPPI does represent a good approximation of the Company's input price growth for use in a price index formula. Having said that, *I recognize the concerns that have been raised ... I would recommend a compromise on the input price differential* for an interim period with the commitment to study the data at a future time. ... I recommend that 1.0% be reflected as a static adjustment to GDP-PI for a period of time.⁹¹

Illinois Bell has thus already acknowledged that its input price inflation rate is less than GDP-PI rather than greater than GDP-PI, as it first had claimed.

As in California and Pennsylvania, the recently released proposed decision by the hearing examiners in Illinois, found that:

88. Proposed Decision of ALJs, Pennsylvania Public Utility Commission, Docket No. 930715, *The Bell Telephone Company of Pennsylvania's Petition and Plan for an Alternative Form of Regulation Under Chapter 30 of the Public Utility Code*, April 29, 1994 at 175. The final X factor proposed by the ALJs is 5.29% (at 183), a factor much larger than the FCC's current 3.3% X factor.

89. Testimony of David J. Roddy, Attorney General Exhibit 2.0 (July, 1993), Illinois Commerce Commission Docket No. 92-0448, *In the Matter of Illinois Bell Telephone Company's Petition to Regulate Rates and Charges of Noncompetitive Services under an Alternative Form of Regulation*.

90. Rebuttal Testimony of Laurits Christensen, Illinois Bell Exhibit 5.6 (September, 1993), Illinois Commerce Commission Docket No. 92-0448, at 14.

91. Rebuttal Testimony of David H. Gebhardt, Jr., Illinois Bell Exhibit 1.30 (September, 1993), Illinois Commerce Commission Docket No. 92-0448, at 47-51 (emphasis added).

The uncontroverted evidence in this proceeding is that input prices for Illinois Bell [IBT] have lagged significantly behind the GDPPI. Dr. Christensen confirmed Dr. Roddy's calculation that the GDPPI grew at 3.7% per year during 1984-1991, while IBT's input price grew at the GDPPI minus 1.6. This implies that IBT's input prices grew at a rate 2.5% slower than economy-wide input prices.⁹²

The hearing examiners then implemented the input price differential after adjusting for the effects of certain tax law changes.⁹³

These detailed analyses in three states have clearly produced the consistent conclusion that LEC input prices grow more slowly than the GDP-PI. It is our belief that the Commission cannot ignore the prevailing evidence on this issue.

2. Calculation of the growth rate of actual LEC total factor productivity Input in the post-divestiture timeframe

Second, we believe that estimation of the historical productivity factor based on actual LEC data for the post-divestiture time frame is a critical component in the determination of the appropriate X factor in the LEC price cap program. Specifically, the "productivity factor" in the rate adjustment formula should reflect the high productivity levels achieved and achievable by LECs in this era of rapidly increasing technology. The inclusion of a productivity component in the X factor is driven by sound economic principles. Productivity measures the efficiency with which inputs such as capital, labor, and materials are used by a company to produce the products and services (the outputs) that it sells to the public. Increases in productivity can be achieved by producing a higher quantity of the outputs with the same level of the inputs; alternatively, it can be achieved by producing the same output level with a lower quantity of inputs. A third possibility is the production of a higher level

92. Proposed Decision of Hearing Examiners, May 3, 1994, Illinois Commerce Commission Docket No. 92-0448, *In the Matter of Illinois Bell Telephone Company's Petition to Regulate Rates and Charges of Noncompetitive Services under an Alternative Form of Regulation*, at 37. The 2.5% differential is calculated as follows. The hearing examiners accept the undisputed fact that economy-wide input prices are equal to GDP-PI plus the economy-wide productivity growth rate of 0.9%. Thus GDP-PI grew at 3.7%, economy-wide input prices grew at 4.6%, and Illinois Bell input prices grew at 2.1%. Thus, IBT input prices are 1.6 points below GDP-PI and 2.5 points below economy-wide input prices.

93. *Id.*, at 38. The final X factor proposed by the hearing examiners is GDP-PI minus 3.8 (at 39-40). This figure is less than those proposed in California and Pennsylvania; however it is still greater than the FCC's current 3.3.% X factor.

of the outputs with a lower level of the inputs. In general, increases in productivity from one year to the next result in decreases in the real cost of producing goods and services sold to the public.

LEC cost reductions over the past decade are the direct result of the productivity achieved by these companies. Some industries have high productivity; others have more moderate gains. In many respects the productivity rate depends upon the technology changes which impact the cost structure of the industry. In telecommunications, there have been extensive cost-reducing and service-improving changes driven by a wide range of hardware and software innovations. Such advances as digital switching, fiber optic transport, and new signalling technologies provide the LECs with tremendous opportunities for productivity growth. This translates directly into cost reductions which can — and should — be passed on to business and residential customers — and which would be passed on if the LECs operated under competitive market conditions.⁹⁴ In the establishment of alternative regulation in California, the Commission noted:

Ongoing deployment of a number of technological improvements such as fiber optic transmission systems, digital switches, and new signalling technologies hold a promise of continued reductions in utility costs. The introduction of new products and services and rapid demand growth for existing services are expected to increase utilization of the network and as a result lead to per-unit cost reductions.⁹⁵

With further price reductions in (and increases in the capabilities of) semiconductors, computers, switches, software, and other capital goods, this substantial productivity trend should continue. Combined with LEC cost reduction programs, this should result in a perhaps substantial productivity growth rate for the LEC industry.

Productivity gains can occur both within the subject industry as well as in the markets that supply inputs to that industry. In the case of telecommunications, technology and competition in the equipment market has produced large and continuing drops in the prices of most capital inputs to the LECs' production activities. Yet by accepting the LECs' assumption that LEC input prices were growing even faster than the general output price inflation rate as reflected

94. Compare the almost unprecedented rate of cost decreases that have been flowed through to consumers in the personal computer industry with the far slower rate of real price decreases that has prevailed for regulated telecommunications services. Inasmuch as both of these industries share a common technological base, the primary source of the large gap between the two must be that the personal computer market is highly competitive whereas the LEC market is about as close to a perfect monopoly as one can find in the US economy.

95. California Public Utilities Commission, Decision 89-10-031, 33 CPUC 2d 43, 157 (October 12, 1989).

in GDP-PI, the “productivity offset” adopted by the FCC simply ignores these input productivity gains.

For this reason, the correct representation of LEC output price changes must combine the historic productivity growth rate achieved by the LECs and the productivity gains as reflected in LEC input prices that have been achieved by suppliers. Thus, with respect to historic productivity growth, the formula should be represented as GDP-PI *minus* the input price differential *minus* the historic LEC productivity growth rate. Usually the productivity concept is based on total factor productivity (TFP) which incorporates changes in all inputs (capital, labor, and materials) simultaneously. As with the input price component, in order to implement an alternative regulation program, the Commission needs to determine a target productivity growth rate which should be assumed for the term of the plan. This growth rate should represent a realistic assessment of both historic and near-term forecasts of the cost reductions that the company can – and should – achieve.

If the target productivity component of the X factor is set unrealistically low, such that it consistently understates the *actual* productivity gain achievable by LECs, the price adjustment mechanism will fail to simulate a competitive result. A competitive model assumes that a company will increase prices only to the extent that increases in its input price level exceed gains in productivity. In contrast, a price adjustment formula that understates available productivity gains will allow the LECs to increase prices even when increases in its input price level are less than its productivity gains. Thus, the LECs will increase prices under the same circumstances that would cause a company operating in a competitive market either to freeze or to reduce its prices.

The exact productivity rate to be used in the X factor is a matter of historical calculation and empirical analysis. A survey of results in seven states, suggests that the average productivity rate is certainly greater than the 3.3% base factor already determined by the Commission.⁹⁶ The Commission must therefore increase its X factor in accordance with this actual empirical evidence. Otherwise, the productivity gains achieved under the price cap system thus will not be flowed through to ratepayers, resulting in windfall gains in the LEC's earnings. In short, US businesses and residents would be adversely and inappropriately impacted with higher rates.

96. Calculations for the seven states are shown in Table 6 below. The full X factor results for all three components (including a 1.0% stretch factor) imply at least an X factor of 5.8%. Although we do not at this time have a specific value to recommend to the Commission as a final proposed X factor, we believe that the evidence is significant and substantial that the current 3.3% is too low.

3. Implementation of a stretch factor (consumer productivity dividend) to account for the effects of price cap program-induced economic benefits

The price cap formula should also incorporate a "stretch" component to recognize the salutary aspects of alternative regulation upon LEC efficiency and productivity. The time period covered by *historical* productivity studies that have been used to determine the productivity factor necessarily *pre-dates the adoption of alternative regulation* and hence cannot capture the (presumably) beneficial impact of the alternative regulation (as distinct from the present RORR regime) upon LECs' efficiency and productivity. The productivity factor, however, should more than merely reflect historic LEC productivity gains; it should also incorporate a stretch component that would both encourage the Company to improve its overall efficiency and also recognize the salutary effects of alternative regulation itself in stimulating additional productivity improvements.

Indeed, one of the key motivations for establishing a price regulation plan is to stimulate even greater efficiency and productivity improvements than have been obtained under traditional rate of return regulation. Thus, it is appropriate that some increment over the historic productivity growth rate should be applied to afford a "consumer productivity dividend" or stretch that guarantees some minimum level of benefit to ratepayers from the implementation of price cap regulation.

There is no absolute or precise value for this component, but the concept has been recognized by the FCC as well as by other regulatory authorities. For example, the Commission included the concept of a "consumer productivity dividend" in its original price cap proposal as a specific device for sharing the efficiency gains expected to arise out of alternative regulation with ratepayers.⁹⁷ The California Public Utilities Commission took note of the FCC's consumer dividend and included it in its overall discussion of the stretch component in its New Regulatory Framework decision.⁹⁸ The California PUC stated that "[w]hile not precise, we conclude that about 1-1/2 to perhaps 2% of the adopted productivity adjustment will arise from the heightened incentives in the new regulatory framework."⁹⁹ This is significantly supported by stretch factors of 2.0 in California, 2.0 in Pennsylvania, and 0.5 in Illinois all adopted in very recent proposed price cap decisions.¹⁰⁰

97. *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, *Further Notice of Proposed Rulemaking*, 3 FCC Rcd 3195, 3407-08, released May 23, 1988.

98. California Public Utilities Commission, I.87-11-033, D.89-10-031, 33 CPUC 2d 43, 131 (1989).

99. *Id.* at 183.

100. See the proposed decisions cited in footnotes 86, 88, and 92 *supra*.

The stretch component should be applied as an additional offset to the GDP-PI inflation index. Combining all three components, the formula is then be represented as GDP-PI *minus* the input price differential *minus* the historic LEC productivity growth rate *minus* the stretch component.

Technical Analysis of Item 1. Calculation of the growth rate of LEC Input prices relative to the growth rate of national inflation

The difference between the LEC input price assumption (originally adopted by the Commission¹⁰¹) and the correct X factor can be expressed and clarified via several equations. The LECs start with the assumption that the rate of change of LEC input prices is equal to the rate of change of input prices for all firms in the US economy. This is expressed as

$$(1) \quad d IP_T = d IP_{US}$$

where IP denotes input prices and the subscripts T and US denote the telecommunications industry and the US economy respectively. This fundamental assumption is the sole reason for the subtraction of US economy productivity (as implemented by the Commission) in the price cap formula. In fact, this is clearly documented in presentations by LEC-sponsored studies by economists Shankerman, Taylor, and Christensen.¹⁰² This LEC argument flows from the assumption in equation (1). In order to prove their result, the LECs then use the well-known macroeconomic relationship that US input prices grow at the US output price (OP) growth rate plus the growth in US total factor productivity (TFP):

$$(2) \quad d IP_{US} = d OP_{US} + d TFP_{US} .$$

Substituting the results of equation (2) into equation (1) yields the result, according to the

101. In the LEC Price Caps CC Docket 87-313 *Second Report and Order* at para. 74, the Commission states: "[t]he productivity offset subtracts the amount by which LECs can be expected to outperform economy-wide productivity gains". Although the Commission never explicitly investigated the assumption embodied in equation (1), it is clear from the quotes above that the Commission accepted the LEC argument and especially the final LEC result cited in equation (6) below.

102. See their testimony cited at footnote 84 *supra*.

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LECs, that telecommunications input prices grow at a rate faster than the US national output price growth rate:

$$(3) \quad d IP_T = d OP_{US} + d TFP_{US} .$$

In the next step, the LECs utilize an undisputed relationship that in a price cap program which adequately simulates competitive conditions, the telecommunications output price growth rate equals the telecommunications input price growth rate minus the telecommunications total factor productivity growth rate:

$$(4) \quad d OP_T = d IP_T - d TFP_T .$$

Substituting the results of equation (3) into equation (4) yields

$$(5) \quad d OP_T = d OP_{US} + d TFP_{US} - d TFP_T$$

which, after substituting the GDP-PI for the US output price growth rate, can be rearranged to the LEC's (and the Commission's) final result:

$$(6) \quad d OP_T = GDPPI - \{ d TFP_T - d TFP_{US} \} .$$

This is in direct contrast to the alternative formulation, discussed above, that recognizes the *fact* that LEC input prices grow less, not more, rapidly than GDP-PI.

$$(7) \quad d OP_T = \{ GDPPI - IPDIFF \} - d TFP_T .$$

where IPDIFF is the average post-divestiture input price differential between the GDP-PI and the LEC telecommunications input price growth rate. This formulation clearly does not employ the assumption embodied in equation (1). Rather, it relies upon an empirical analysis of actual LEC data for the post-divestiture timeframe to directly calculate the undisputed equation (4). The difference between the GDP-PI and actual LEC input prices can be calculated directly from LEC data in an objective empirical analysis.

It is important to point out that *the sole difference between the LEC results in equation (6) and the formulation shown in equation (7) is the assumption in equation (1) that telecommunications input prices grow at the same rate as national economy US input prices.*¹⁰³ The critical problem with the LEC assumption in equation (1) is that virtually all of the empirical research on post-divestiture LEC input price movements show that the LEC assumption is wrong.

Empirical studies — conducted by economists who have pursued both LEC-sponsored and consumer group-sponsored analyses — have agreed that LEC input prices grew at *less than GDP-PI* for the post-divestiture timeframe. These results are shown in Table 6.¹⁰⁴ Thus, in the post-divestiture period, average nation-wide LEC input prices grew at a rate of 1.0 percentage points *less* than the GDP-PI.

This implies that the input price differential in equation (7), denoted as "IPDIFF," is positive: Thus, GDP-PI grows at a rate greater than LEC input prices. This is clearly shown in Table 6, which lists the major post-divestiture studies of individual LECs which provide enough information to calculate input price growth rates.¹⁰⁵ The results are dramatically clear: Empirical analysis shows that the assumption embodied in equation (1) is absolutely

103. LEC economists typically argue that the average US Total Factor Productivity average annual growth rate of 0.9 for the 1984-1991 time period should be added to the GDP-PI. See, for example, the testimony of Dr. Laurits Christensen on behalf of Illinois Bell cited *supra* at footnote 84. This results in a proposed (incorrect) LEC input price assumption of GDP-PI *plus* 0.9.

104. The sources for the data in Table 6 are: (New York:) Theodore Barry & Associates, Scott, Madden & Associates, and Economics and Technology, Inc., *Potential Performance Gains Study of New York Telephone Company*, for the New York Public Service Commission Staff, November, 1992; (Indiana:) Testimony of Dr. Laurits R. Christensen, Indiana Bell Exhibits LRC-1 through LRC-5, Indiana Regulatory Commission Cause No. 39705; (Illinois:) Testimony of Dr. Laurits R. Christensen, Illinois Bell Exhibits 5.0 through 5.5, Ill. C.C. No. 92-0448 and Testimony of David J. Roddy on behalf of the Attorney General of the State of Illinois, Illinois Commerce Commission Docket No. 92-0448, AG Exhibit 2.0, July 12, 1993; (Delaware:) Testimony of David J. Roddy on behalf of the Public Service Commission Staff, Delaware Public Service Commission Regulation Docket No. 33, May 17, 1993; (California:) Testimony of David J. Roddy on behalf of CARE (California Alliance for Rate Equity), Applications 92-05-002 and 92-05-004 before the California Public Utilities Commission, April 8, 1993; (Ohio:) Testimony of Laurits R. Christensen, PUCO Case No. 93-487-TP-ALT, Ohio Bell Exhibit 26.0 with attachments 26.1 through 26.5, and (Pennsylvania:) Testimony of David J. Roddy on behalf of the Pennsylvania Cable Television Association, Docket No. 930715 before the Pennsylvania Public Utility Commission, December 15, 1993. A summary of these results is provided in David J. Roddy, "Empirical Analysis of Local Exchange Carrier Input Price Trends Since Divestiture," Economics and Technology, Inc., January, 1994.

105. Table 6 also shows the TFP growth rates from the referenced studies. These results will be discussed in the technical analysis of LEC productivity which is presented in the next section. The base X factor shown does not incorporate a stretch factor as discussed in the next section. Given a stretch factor of 1.0 percentage point, this implies an average X factor of 4.8% plus 1.0% which equals an X factor of 5.8%.

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incorrect. Thus, the LEC result (also adopted by the Commission) underlying the “differential productivity” calculation, should be modified by adopting a higher X factor. This new information — gained from sound empirical analysis of actual LEC data — thus must now be used to refine the Commission’s approach to the price cap X factor calculation.

Table 6

Productivity and Input Price Growth Rates

Average Annual Growth Rates

1984-1991

Study	TFP	Input	Base
	Growth	Price	X
	Rate	Differential	Factor
California	6.5%	1.6%	8.1%
New York	2.9%	1.0%	3.9%
Pennsylvania	2.9%	0.3%	3.2%
Delaware	5.4%	0.7%	6.1%
Illinois	2.2%	1.6%	3.8%
Indiana	3.7%	0.8%	4.5%
Ohio	2.8%	1.0%	3.8%
Average	3.8%	1.0%	4.8%

Note: The Base X Factor shown is before the addition of the stretch factor.

Technical Analysis of Item 2. Estimation of the historical productivity factor based on actual LEC data for the post-divestiture timeframe

The Commission asks for comments as to the appropriate and reasonable method for calculating historical productivity growth. In this technical analysis, we describe the widely accepted and commonly used method for calculating total factor productivity in the LEC segment of the telecommunications industry.

The growth rate of total factor productivity is calculated as the output growth rate minus the input growth rate. Some researchers, including the BLS, use the term "multifactor productivity" to describe the same concept. In this analysis, we use the Divisia index approach, which is now widely used to measure total factor productivity. The federal government has a program using the Divisia method; this is discussed in Bureau of Labor Statistics (1983, 1988), Mark and Waldorf (1983), as well as in a recent BLS study of railroad industry productivity reported in Duke, Litz, and Usher (1992).¹⁰⁶

Since the original Divisia index formula required continuous time data, it is generally implemented via a Tornquist formulation which uses discrete time data. Various authors have referred to the result as the 'Tornquist discrete time approximation to the Divisia index.' Further research by Caves, Christensen, and Diewert (1982), among others, uncovered a relationship between the Translog functional form and the Divisia — Tornquist approach.¹⁰⁷ Thus, authors sometimes refer to the Tornquist approximation of the Divisia index as a 'translog' index. Throughout this analysis, we refer to this approximation as a "Divisia" Index.

In algebraic terms, the rate of change of Total Factor Productivity is the rate of change of the ratio of aggregate output to aggregate input:

106. Bureau of Labor Statistics, *Trends in Multifactor Productivity, 1948-1981*. U.S. Government Printing Office, September, Bulletin 2178, 1983; Bureau of Labor Statistics, *BLS Handbook of Methods*, U.S. Government Printing Office, Bulletin 2285, 1988; Mark, J. and W. Waldorf, "Multifactor Productivity: A New BLS Measure," *Monthly Labor Review*, (December, 1983), 3-15; and Duke, J., D. Litz, and L. Usher, "Multifactor Productivity in Railroad Transportation," *Monthly Labor Review*, August, 1992, 49-58 and "Technical Note, Multifactor Productivity Index, Class I Railroads, SIC 4011".

107. Caves, D., L. Christensen, and W. Diewert, "The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity," *Econometrica*, 50, (1982), 1393-1414.

$$(8) \quad \Delta TFP = \Delta \ln \left(\frac{Q}{F} \right) = \Delta \ln(Q) - \Delta \ln(F)$$

where Q represents an index of outputs and F represents an index of inputs. The traditional Tornquist Translog discrete time approximation to the continuous time Divisia index formulation is:

$$(9) \quad \Delta \ln (F) = \frac{1}{2} \sum_j^n (s_{jt} + s_{jt-1}) \ln \left(\frac{X_{jt}}{X_{jt-1}} \right)$$

where X_{jt} is the quantity of input j in year t and s_{jt} is the share of total cost of input j in year t.

This residual method of TFP calculation includes the effects of economies of scale, technical progress, changing capacity utilization, as well as managerial efficiency. This concept is thus appropriate for application in telecommunications incentive regulation programs.

Inputs

In the standard TFP approach, input is a Divisia Index of Labor, Capital and Materials. Available data allows us to use one category of labor, one category of materials, and six categories of capital. Labor is based upon number of employees, materials is based upon purchases of non-capital goods and services, and capital is based upon actual investments combined with a capital stock construction method commonly used in both government and academic productivity studies.

Labor

Labor quantity starts with the total number of employees as specified in the LEC Annual Reports. In order to avoid double counting of capitalized labor, this analysis uses expensed labor in the calculations. First, capitalized labor compensation was subtracted from total labor compensation and then the number of expensed employees was calculated based upon the ratio

of expensed wages to total wages.¹⁰⁸ The price of labor is based upon expensed labor compensation, which is calculated as wages plus benefits plus the employer contribution of social security payroll taxes, taking into account changes in the Uniform System of Accounts Revision in January of 1988. This data is detailed in the Annual Reports. The annual wage is then expensed compensation divided by the number of expensed employees.

Capital

Capital is a Divisia Index of six categories of capital stock:

- Land
- Vehicles and Work Equipment
- Buildings
- Furniture and Office Equipment
- Cable and Wire
- Central Office Equipment and Other

Investment data on these categories is available in the LEC Annual Reports.¹⁰⁹ We use the *perpetual inventory method* to construct the measure of capital stock that is used to measure TFP.¹¹⁰ The equation which defines the perpetual inventory method is written:

$$(10) \quad K_t = (1 - \delta)K_{t-1} + I_t$$

where δ is the annual rate of economic depreciation, K is the constant dollar capital stock, and I is investment in constant dollars in year t . The annual rate of economic depreciation is based upon the "best geometric approximation" approach of Hulten and Wycoff (1981) as

108. In this variation, we subtract from labor the component which was already counted in the capital stock. This avoids double counting of capitalized labor. Duke, Litz, and Usher (1992) *op. cit.* footnote 106 also use this procedure. Another valid approach would be to subtract capitalized labor from the capital stock calculations. This would also avoid double-counting.

109. We use only data for the categories summing to "telecommunications plant in service".

110. See, e.g., E. Berndt, *The Practice of Econometrics*, Reading: Addison Wesley, 1991 at 227-232 on this method. Also see D. Jorgenson, "Capital as a Factor of Production" in D. Jorgenson and R. Landau, eds., *Technology and Capital Formation*, Cambridge: MIT Press, 1989 at 41-54.

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discussed in Jorgenson (1990) at 41-46.¹¹¹

Constant dollar investment is obtained by deflating the investment data in each asset class by the applicable Telephone Plant Indexes (TPI) of prices which are typically available from the LECs. The economic depreciation rates for each asset class are based upon Jorgenson (1990), Table 3.6, at 45.¹¹² The user cost of capital weights are based on the general method discussed in Diewert (1980), Jorgenson (1989), Hulten (1990), and Berndt (1991) which yields

$$(11) \quad c_t = J_t (r_t + \delta - \Delta J_t / J_t)$$

where c is the user cost of capital, r is the rate of return, and J is the applicable TPI price index.¹¹³

Materials

Materials input is calculated as total operating expenses minus total depreciation and amortization minus expensed wages, benefits, and payroll taxes. We also accounted for the different treatment of payroll taxes due to the Uniform System of Accounts Revisions in January of 1988. Materials expense was then deflated by the Fixed Weight Gross Domestic Product Price Index (GDP-PI). Materials includes various amount of purchased services which may include some labor. Such expenses are billed back to the carriers and shown in

111. Hulten, C. and F. Wykoff, "The Estimation of Economic Depreciation Using Vintage Asset Prices: An Application of the Box-Cox Power Transformation," *Journal of Econometrics*, 15:3 (April, 1981), 367-396 and Jorgenson, D., "Productivity and Economic Growth" in E. Berndt and J. Triplett, eds. *Fifty Years of Economic Measurement*, Chicago: University of Chicago Press, 1990.

112. The relationship between the estimated service life and the economic depreciation rate is discussed in footnote 28 of Hulten (1990). The rates used are land (0.000), vehicles and work equipment (0.1633), buildings (0.0225), furniture and office equipment (0.1179), cable and wire (0.0500), and central office equipment and other (0.100).

113. See, e.g., Berndt *op. cit.*, footnote 110; Jorgenson *op. cit.*, footnote 110; Diewert, W. E., "Aggregation Problems in the Measurement of Capital," in D. Usher, ed., *The Measurement of Capital*, Chicago: University of Chicago Press, 1980; and Hulten, C. "The Measurement of Capital," in E. Berndt and J. Triplett, eds., *Fifty Years of Economic Measurement*, Chicago: University of Chicago Press, 1990. The effects of changing tax rates, the tax effects of depreciation, and the effects of investment tax credits on the user cost of capital could also be taken into account as per L. Christensen and D. Jorgenson, "Measurement of U.S. Real Capital Input, 1929-1967", *Review of Income and Wealth*, Series 15, No. 4, December 1969, at 293-320.

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the "other" category of operating expenses.

Output

Available data generally allows the calculation of only one category of output. Aggregate output is composed of total revenue from the Annual Reports deflated by the applicable output price indexes to produce a constant dollar output index.¹¹⁴ Although this deflated revenue quantity index is popular in the telecommunications industry, it is not perfect for purposes of TFP measurement. For TFP calculation, we would like a physical measure of output which reflects the many activities, products and services that LECs provide to the public. By "physical" we mean minutes of use, number of calls, number of access line connections and disconnections, "bandwidth" and such measures which customers view as the telecommunications service that they are purchasing.

However, the amorphous and diverse nature of telecommunications services makes construction of a physical index quite complicated. It gets even more complicated over the last ten years because the rapid growth in the lease of private lines which essentially provide bandwidth to customers to use for voice, data, and video, makes traditional measures somewhat weak. For example, the use of number of access lines would be inappropriate since a T-1 private line (with 24 channels) would erroneously be counted as an equivalent to a single voice grade private line (with 1 channel) and these should be further differentiated from traditional residential switched access lines. These 'physical' output measurement difficulties have resulted in widespread use of the "deflated revenue" measure in Total Factor Productivity studies¹¹⁵ as well as in the carriers' own testimony and data related to rate case demand elasticity and forecasting processes.¹¹⁶

114. The output price indexes are sometimes maintained by the LECs for a variety of internal purposes. It is also possible to calculate output price indexes based on the rate impact information provided by LECs in state regulatory dockets as well as in the LECs' Annual Report Form M which is submitted annually to the Commission.

115. See, for example, AT&T, *Bell System Productivity Study, 1947-1979*, AT&T Economic Analysis Section, September, 1980; Christensen, L., "Testimony of L. Christensen" filed in *United States v. AT&T*, Civil Action No. 74-1698 (D.D.C. filed Nov. 20, 1974), dated 1979; Denny, M., M. Fuss, and L. Waverman, "The Measurement and Interpretation of Total Factor Productivity in Regulated Industries, with an Application to Canadian Telecommunications," in *Productivity Measurement in Regulated Industries*, T. Cowing and R. Stevenson, eds., New York: Academic Press, 1981; and Nadiri, M. and M. Shankerman, "The Structure of Production, Technological Change, and the Rate of Growth of Total Factor Productivity in the U.S. Bell System," in *Productivity Measurement in Regulated Industries*, T. Cowing and R. Stevenson, eds., New York: Academic Press, 1981.

116. In general, our research indicates that non-deflated revenue measures that attempt to use physical quantities generally indicate a higher output growth rate than that from deflated revenues.

Summary

As we noted earlier, the exact productivity rate to be used in the X factor is a matter of historical calculation and empirical analysis. The objective of this technical note is to respond to the Commission's questions as to the appropriate method to use to conduct such an analysis. This section has detailed the prevailing economic approach to measurement of Total Factor Productivity which has been developed by a wide variety of economists. We have shown explicitly the application of these economic methods to actual LEC historical data.

A survey of results in seven states,¹¹⁷ suggests that the average productivity rate is certainly greater than the 3.3% base factor already determined by the Commission. The full X factor results for all three components (including a 1.0% stretch factor and a 1.0% input price differential) implies at least an X factor of 5.8%. Although we do not at this time have a specific value to recommend to the Commission as a final proposed X factor, we believe that the evidence is significant and substantial that the current 3.3% is too low. In accordance with this actual empirical evidence, the Commission must therefore increase the X factor in the LEC price caps formula. Otherwise, the productivity gains achieved under the price cap system will not be flowed through to ratepayers, resulting in windfall gains in the LEC's earning.

117. We do not necessarily agree with the detailed methodology of all of the productivity studies in Table 6; nevertheless, we show them in the Table to assist the Commission in its analysis.

Baseline Issue 3b: Are the price cap LECs' profits levels reasonable under the current LEC price cap plan in light of the price cap goal that higher profits are intended to be the reward for attaining increased efficiencies?

Price Cap LECs' profit levels have been excessive under price caps.

The Commission has, from the outset, adhered to the conviction that price cap regulation would stimulate improved LEC efficiency, because under this form of regulation LECs would be permitted to retain a substantial portion of any increase in profits brought about by such initiatives. As economic theory shows,¹¹⁸ in competitive markets the fruits of any efficiency gains are temporary at best, since eventually other firms will copy and adopt the same methods, or even come up with new ones of their own. Thus, it should distinctly not be a goal or a result of price cap regulation that LECs can retain such profit growth indefinitely.

That having been said, it is also important to recognize that improving efficiency, reflected in lower unit costs, is not the only strategy available to a LEC to increase profits under price cap regulation. A LEC could, for example, achieve a short-run gain in profits by postponing necessary maintenance, plant replacement, or new construction, or by scaling back personnel or other resources. These strategies could of course result in an erosion in service quality, and for this reason the Commission monitors LEC quality indicators to satisfy itself that this method of improving profits is not the one being pursued.¹¹⁹

There are of course several other means by which LECs can increase their profits that have nothing to do with efficiency gains. While limited segments of the overall LEC market confront varying degrees of competition, the vast majority of LEC services are still furnished under fundamentally monopolistic conditions; if permitted to do so, LECs could easily extract excess profits merely by setting prices for these services at supracompetitive levels. In theory, price cap regulation is supposed to foreclose this possibility by tying the LECs' price movements to general price level changes offset by industry-wide productivity gains. However, this device will work only to the extent that the parameters of the price adjustment mechanism itself have been properly set. If the price adjustment mechanism operates so as to permit LEC rates to rise faster than LEC costs over an extended period of time, then

118. *Op. Cit.*, footnote 49.

119. The impact of such strategies on overall service quality may not be immediately visible. For example, a decision to defer preventive maintenance or plant replacement increases the probability of service interruptions but may not necessarily right away. Since the Commission's service quality indicators capture only *current* results, any such lag between the curtailment of expenditures and an erosion in service quality may not be readily apparent or detectable.

supracompetitive price levels and profits will result. And since, in competitive markets, excessive profit levels *would not be sustainable over an extended period of time*, the presence of consistently high LEC earnings levels must be interpreted as compelling evidence that LEC prices exceed "competitive result" levels.

How can a price cap system produce this type of undesirable result? Suppose, for example, that the GNP-PI (or GDP-PI), although a widely used published inflation index, does not accurately track the *specific changes in input costs* that are confronted by local exchange carriers. Or what if the industry productivity growth rate, which is based upon long-term historic trends, simply fails to capture conditions prevailing today? Indeed, we have elsewhere in this Report¹²⁰ shown that both of these conditions apply: The national output price index overstates the growth in *input prices* that LECs confront, and the historic productivity experience upon which the annual productivity "offset" has been based fails to adequately reflect the enormous gains that are achievable and that are being achieved through the deployment of technology that was not even available as recently as five years ago. If the price cap rate adjustment mechanism permits rates to increase by more than the legitimate, expected growth in costs, and if LECs avail themselves of the maximum allowable increase under the price cap rate adjustment mechanism, the *effect* is to set prices at supracompetitive, monopolistic levels, that is, to engage in monopolistic *price gouging*.

Unfortunately, it is not very easy to determine which condition — improved efficiency or excessive price increases — accounts for profit growth. Moreover, it may even be difficult to accurately identify and quantify "profit" *per se*, since LECs may employ any of a number of devices to effectively convert potentially excessive profits into other forms of cash flow. For example, faced with the possibility of having to report an excessive rate of return (by "competitive result" standards), a LEC can (if permitted) increase depreciation rates and annual depreciation charges so as to "soak up" the excess profit levels while still maintaining the same overall cash flow for reinvestment in regulated or nonregulated, LEC or affiliate, businesses. That LECs have engaged in such practices is readily apparent: While all seven RBHCs committed large amounts of investment capital to their regulated local exchange carrier (BOC) businesses in the years immediately following the break-up of the former Bell System, in recent years those same companies have curtailed new capital spending by their BOC subsidiaries and have, in some cases, effectively *disinvested* in their BOCs by taking out more in annual depreciation charges than was introduced in gross plant additions. NYNEX, Pacific Telesis and Southwestern Bell Corporation have in fact disinvested in their BOCs for several years. Specifically, NYNEX has not made any net new investment in its BOCs since 1989; Pacific Telesis did not make any net new investment in its BOCs during the 1987-91 period; and Southwestern Bell has not made any net new investment in its BOC since 1987, with the exception of 1992.

120. See, responses to Issues 3a and 3c.

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In some cases, BOCs actually paid out more in cash dividends to their parent RBHC than their total earnings for a particular year, in effect transferring the positive cash flow produced by the excessive depreciation charges through to the parent rather than reinvesting it in the local exchange business. Indeed, the Commission should take particular note of the fact that in the three years 1991-93 operating under price cap regulation, the RBHCs have committed proportionately more of their investment capital in *non-BOC* affiliates and subsidiaries than under the former rate of return regime. During the 1991-93 period, the RBHCs committed 20% of total investments to non-BOC affiliates, while during the 1984-90 period, such non-BOC investments accounted for about 9% of total RBHC capital spending.¹²¹

One might argue that this was precisely what was supposed to happen under price caps: After all, one of the long-standing criticisms of rate of return regulation was the so-called "Averch-Johnson effect,"¹²² under which ROR-regulated utilities were seen as having a strong incentive to "gold plate" their capital base in order to increase overall earnings. The problem is that the dramatic shifts in RBHC investment strategies over the past several years have not been reflected in post-price cap rate levels *precisely because the parameters of the price cap system itself were defined in an environment in which ROR regulation was still in control and in which the A-J effect was fully operative.*

Current RBHC profit levels grossly exceed the reasonable capital-attraction needs of the regulated BOCs. Wall Street views the RBHCs as "cash cows" having enormous liquidity and capital to commit to *non-LEC* ventures.¹²³ In the ten years since the break-up, the seven RBHCs have made net new investments (over and above depreciation charges recovered through rates imposed for regulated services) in their BOC subsidiaries amounting to some \$13.5-billion. During that same period of time, the seven regional Bells have placed some \$21.1-billion in *non-BOC* subsidiaries in the US and abroad. *In the three years since the onset of FCC price cap regulation, net BOC investment was only \$564-million, whereas some \$11-billion was placed in non-BOC ventures.*¹²⁴

It is also important to emphasize that the dominant source of each RBHC's financial

121. Calculations based upon data extracted from FCC Form M Annual Reports for all BOCs, 1984-92 and SEC 10-K Reports for all BOCs and RBHCs, 1993.

122. Averch-Johnson, *op. cit.* footnote 7.

123. On its April 12, 1994 report, "Telecommunications Service Companies," Smith Barney Shearson views RBHCs' stocks as "...quite attractive, particularly for investors concerned about the market outlook." Also see, "Telecommunications Services: Bell Regional Holding Company Outlook," Morgan Stanley & Co. Inc., March 29, 1994 and *Value Line Investor's Survey*, April 15, 1994. Value Line rates all RBHCs with an A+ and the companies' Beta coefficients are given in the range of .75-.95, indicating below-average risk.

124. Form M and 10-K Reports, *Op. Cit.*, footnote 121.

strength is its BOC subsidiaries. In the three years since the onset of price caps, total RBHC earnings were \$21.9-billion, of which \$21.2-billion, *or about 97%*, came from the BOCs. To put this in its proper perspective, even though BOC *earnings* accounted for 97% of total RBHC profits, the BOC subsidiaries represented (as of the end of 1993) only 80% of total RBHC assets, and in the three years of the FCC's price cap regime the BOC subsidiaries accounted for only about 5% of new capital investment. There can thus be little dispute that the consistently high BOC profit levels made possible under price caps are supporting the far more risky and (thus far) less profitable non-BOC Regional Bell initiatives.

It is essential that the Commission recognize that the structure and quantitative parameters of the current LEC price cap plan were established with no prior experience operating under this form of regulation. While LECs may now resist modification in what has proven to be a revenue windfall by asserting that any change that is based upon actual experience would be equivalent to a reversion to rate of return regulation, the results of actual operation under price caps cannot be so easily dismissed as teaching nothing about the details of the plan itself. If twenty coin tosses produce nineteen "heads," one must consider and investigate the possibility that the coin is not fair before concluding that this highly improbable outcome has occurred purely by chance. Consistently high LEC profits under price caps may be interpreted (by LECs) as "proving" that price cap regulation "works," but it can just as readily support a conclusion that the plan as structured is overly and inappropriately generous to the LECs and that it requires corrective adjustments if its objectives are to be achieved.

The high BOC profit levels are far more the result of excessive prices than of any efficiency gains that may have occurred under price caps. Moreover, it is also clear that reported BOC profits understate the flow of earnings from services currently being furnished, by virtue of the excessive depreciation charges being taken for pre-price caps investments. Moreover, with respect to the mechanics of the price cap system itself, these conditions contribute to an inherently *circular* process in which many results are both self-generating and self-fulfilling. Excessive pre-price caps investment levels had the effect of understating historic productivity growth, which in turn resulted in an "X-factor" that was lower than it should have been under the very types of more efficient investment policies that price cap regulation is intended to foster. The high levels of pre-price cap investment, in turn, persist into the price cap regime in the form of excessive depreciation charges, which conceal actual supracompetitive profit levels and simultaneously perpetuate the understatement of productivity growth. And finally, to make sure that this "chain letter" is not broken, the RBHCs have announced plans — and filed Section 214 Applications with the Commission — to construct massive new broadband networks that will facilitate their entry into new (and largely nonregulated) markets while imposing the overwhelming majority of the investment costs upon

the BOCs.¹²⁵

For all of these reasons, it is critical that the Commission not limit its examination and evaluation of the results of price cap regulation to surface-level financial reports, but that it delve well below the surface to acquire a full and detailed understanding of the workings and interactions of the various processes that have been launched and/or impacted by the price cap system. And if it does so, the Commission will surely recognize that fundamental changes are necessary in order for this approach to regulation to remain viable and sustainable for the future.

125. For example, of the \$16-billion investment program announced by Pacific Bell in November, 1993, all but about \$500-million would be carried as rate base assets. In its Section 214 "Video Dialtone" applications (Application of Pacific Bell to the FCC, W-P-C-6913-16, December 20, 1993.), Pacific *asserts*, but without any economic or engineering evidence in support of that claim, that the portion of the total broadband network construction program that will be carried in rate base is "necessary" for the efficient production of basic voice telephone services. Permitting Pacific and other RBHCs to embark upon such large-scale investment programs without being required to provide compelling economic support vitiates one of the central premises of price cap regulation — the prevention of overcapitalization. That such investment initiatives are possible under price caps provides further demonstration that the basic parameters of the FCC's current plan result in excessive rate levels and must be revised. *See*, Petition of the Ad Hoc Telecommunications Users Committee to Deny Application, W-P-C-6913-16, February 14, 1994.

Baseline Issue 4: Sharing and Low-end Adjustment Mechanisms

Baseline Issue 4a: Whether the sharing and low-end adjustment mechanisms should be realigned with capital costs, and if so, how this should be done.

Baseline Issue 4b: Whether the sharing and low-end adjustment mechanisms should be revised or eliminated.

The sharing and low-end adjustment mechanisms should be retained, but the Commission must represcribe the benchmark rate of return to reflect the significant decline in capital costs since 1990.

Retention of the sharing and low-end adjustment mechanisms is the best course for ensuring a reasonable balance between providing efficiency incentives to the price cap LECs and protecting interstate access services customers from potential monopolistic pricing practices. The rationale for sharing remains as valid as it was when the price cap mechanism was originally established. First, sharing establishes a means by which ratepayers may directly benefit from the efficiency gains that are (presumably) stimulated by alternative regulation. Second, it serves as a "safety net" for consumers, reducing the impacts of potential errors in the specification of the productivity factor and resulting in at least a partial return of any excess monopolistic earnings that might be accumulated by the LECs. Moreover, competition for LECs' interstate access services remains in its infancy, and has certainly not developed to the point that it can serve the same "safety net" function.

Some of the LECs are likely to raise the same arguments to limit or eliminate sharing as were made during the initial price caps proceeding. Not surprisingly, they would prefer not to return *any portion* of their excess earnings to ratepayers. From the standpoint of the ratepayer, however, the tangible benefits and affirmative protection afforded by earnings sharing greatly outweighs any slight diminution that it may make to carriers' efficiency incentives. In particular, there is no basis for reconsidering the Commission's original decision to have a 50/50 sharing proportion in the basic sharing band. A 50/50 ratio remains the most administratively simple, equitable, and understandable arrangement, and there would be no appreciable benefit to reducing the ratepayer share or introducing a more complicated graduated scheme. Similarly, requiring 100% return of earnings in excess of the basic sharing range is the most straightforward way to protect ratepayers from the extreme

overearnings that may occur in unusual situations.¹²⁶

On the other hand, examination of the revenues distributed for the first three years of price caps through the sharing and low-end adjustment mechanisms reveals that some adjustment is necessary in order to give ratepayers a fairer share of the benefits of the price caps regime. As Figures 2 - 4 demonstrate for the Bell operating companies, the lion's share of excess earnings (i.e., earnings beyond the benchmark rate of return level) have been retained by the LECs, with only minimal amounts returned to ratepayers through the sharing device.¹²⁷ In fact, the total amount of BOC excess earnings shared with ratepayers in 1992, \$27.3-million, was completely *negated* by the low-end adjustment mechanism, which permitted NYNEX to raise rates to recoup some \$29.0-million of its earnings shortfall from 1992 in the following year.¹²⁸ This circumstance is particularly harmful given the evidence that LECs are not using their excess revenues to undertake productivity-improving investments in their networks (see response to Baseline Issue 3b). One partial solution is to move the trigger point for sharing to fifty (50) basis points above the benchmark rate of return, which would provide a more reasonable sharing opportunity for ratepayers than has existed to date.

The Commission is correct to call for a reexamination of the relationship between the sharing and low-end adjustment triggers and capital costs. The general decline in interest rates that has occurred during the term of the plan has permitted the price cap LECs to finance their capital acquisitions at much lower cost than had been contemplated when the current benchmark rate of return of 11.25% was originally set (see Figure 5). In a nonregulated competitive industry, competitive pressures would assure that such cost decreases would be reflected in output price levels.¹²⁹ However, precisely because of the *lack* of effective competition for interstate access services, the price cap LECs have had no incentive to flow through their reduced capital costs into the output price levels charged to their customers. The price cap plan should not permit LECs to realize windfall gains due to capital market decreases, and therefore, the benchmark rate of return used for setting the sharing and low-end adjustment triggers should be reset downward. Accordingly, the Commission will have to undertake a focused review of the financial parameters bearing on the "market" rate

126. For example, even though it elected to use the higher of the two productivity offsets allowed by the FCC's LEC price cap formula (4.3% as opposed to 3.3%), Nevada Bell was still able to earn an return in 1993 of 17.34%, triggering earnings sharing of 50% of its earnings above 13.25% and 100% of its earnings above 17.25%. *Telecommunications Reports*, April 11, 1994, at 12.

127. The graphs compare the total amounts available for sharing and the amounts actually received by ratepayers on a net earnings basis; both values are proportionately larger when compared on a gross revenues basis that would include the effects of tax payouts, etc.

128. NYNEX Form 492A, filed March 31, 1994 at Line 6.

129. Only a fraction of the effects upon LECs of the decline in capital costs are reflected in GDP-PI.

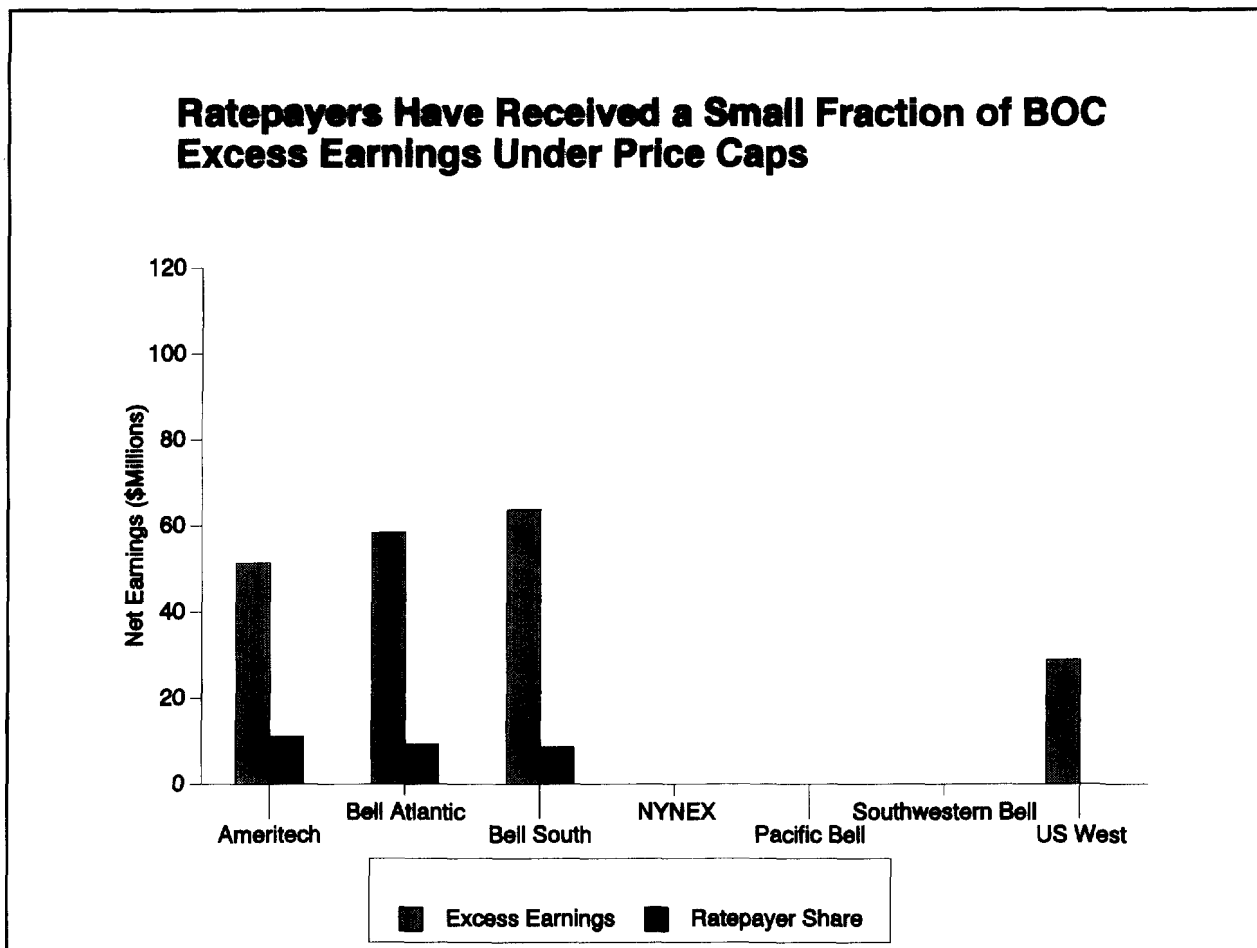


Figure 2 — Bell Operating Company Excess Earnings in 1991

of return level for telecommunications utilities, including the costs of equity capital and capital structure, and determine the appropriate benchmark rate of return level for the next four years of the plan. While the LECs are likely to characterize a represcription of the benchmark as a reversion to rate of return regulation, the Commission must recognize that maintaining a benchmark that accurately reflects the prevailing cost of capital is essential to ensure that the price cap plan will fairly balance the interests of the companies and ratepayers.